

REMARKS/ARGUMENTS

**Claims Status**

Claims 9-18 are pending. Claims 1-8 are canceled without prejudice. Claim 9 is amended to incorporate the subject matter of original claim 8 from which claim 9 originally depended from. In addition, claim 9 includes amendments to the preheating temperature (from 450-650°C to 450-600°C) and the amount of steam (from 240-600 l to 240-400 l) which find support in the specification respectively as follows: page 6, line 26, to page 7, line 1; and page 6, lines 15-18. Claims 10-18 are added. New claim 10 finds support in the specification: page 6, line 26, to page 7, line 1. New claims 11 and 12 find support in the specification: page 6, lines 9-11. New claims 13-15 find support in the specification: page 5, lines 13-15. New claims 16-18 find support in the specification: page 4, lines 25-26. No new matter has been entered.

**§102(b)/§103(a) Rejections in view of *Kayama*, *Ishii* and *Schaumann***

In view of the cancellation of claims 1-8, the following rejections are now moot: (i) rejection of claims 1, 2 and 6 over *Kayama* (JP 2003-327432); (ii) rejection of claims 1 and 7 over *Ishii* (US 6,281,277); and (iii) rejection of claim 8 over *Schaumann* (US 2,488,440). Accordingly, Applicants request withdrawal of these rejections.

**§102(b)/§103(a) Rejection in view of *Kagohashi***

Claims 1-5 and 7-9 are rejected under 35 U.S.C. §102(b) as anticipated by or, in the alternative, under 35 U.S.C. §103(a) as obvious in view of *Kagohashi* (JP 2001-151510). Applicants respectfully traverse this rejection as it applies to pending claim 9 (claims 1-5, 7 and 8 being canceled).

The Office admits that “Kagohashi et al. differ from the instant invention in that the preheating temperature overlaps and/or lies within the instantly claimed range” (Office Action, page 8, first full paragraph) and “Kagohashi et al. differ from the instant invention in that the amounts of oxygen gas, hydrogen gas, and steam differ from the instant invention” (Office Action, page 8, third full paragraph). However, the Office concludes that a *prima facie* case of obviousness exists with respect to *Kagohashi* due to the overlapping ranges as supported by *In re Wertheim*, *In re Woodruff* and *In re Peterson*.

Applicants note that M.P.E.P. 2144.05 (III) states:

“Applicants can rebut a *prima facie* case of obviousness based on overlapping ranges by showing the criticality of the claimed range. ‘The law is replete with cases in which the difference between the claimed invention and the prior art is some range or other variable within the claims.’ ...” (emphasis added).

Accordingly, Applicants provide the following with respect to non-obviousness. The tables below represent a comparison of current claim 9 with Examples 1-3 and Comparative Examples 1-3 from the specification as originally filed as well as Supplemental Experimental Examples 1-4 (which have been provided by the Applicants to the undersigned).

Process Conditions

	Claim	Example			Comparative Example			Supplemental Experimental Example			
		1	2	3	1	2	3	1	2	3	4
Preheating temperature (°C)	450-600°C	500	←	←	←	800	400	600	600	500	500
TiCl <sub>4</sub> feed rate (L/min)	-	0.5	←	←	←	←	←	0.5	0.5	0.5	0.5
H <sub>2</sub> feed rate (L/min)	-	40	←	←	95	40	20	40	40	30	40
Amount of H <sub>2</sub> per 1 L of TiCl <sub>4</sub> (L)	60-90L	80	←	←	190	80	40	80	80	60	80
O <sub>2</sub> feed rate (L/min)	-	40	←	←	95	40	20	40	40	30	40
Amount of O <sub>2</sub> per 1 L of TiCl <sub>4</sub> (L)	60-90L	80	←	←	190	80	40	80	80	60	80
Steam feed rate (L/min)	-	130	200	300	350	130	110	150	200	130	130
Amount of steam per 1 L of TiCl <sub>4</sub> (L)	240-400L	260	400	600	700	260	220	300	400	260	260
Reaction temperature (°C)	-	600	←	←	←	←	←	600	600	600	500

Product (titanium dioxide powder) Properties

	Example			Comparative Example			Supplemental Experimental Example			
	1	2	3	1	2	3	1	2	3	4
Average particle diameter (nm)	70	50	40	12	50	-	70	50	65	40
Rutile content (%)	4.6	2.2	4.2	8.6	92.2	-	8.0	5.0	4.0	3.4
Specific surface area (m <sup>2</sup> /g)	26.0	33.3	42.4	86.2	30.5	-	23.0	28.0	30.0	25.0
D90	1.80	1.18	2.08	2.65	1.85	-	1.10	0.96	0.95	1.29
D50	0.60	0.44	0.41	0.40	0.54	-	0.47	0.33	0.30	0.49
D10	0.18	0.15	0.14	0.10	0.20	-	0.15	0.13	0.10	0.14
SPAN	2.7	4.9	4.7	6.4	3.1	-	2.0	2.5	2.8	2.3

As can be seen from Examples 1 and 2 as well as Supplemental Experimental Examples 1-4, when an anatase-type titanium oxide powder is produced according to the claimed parameters (i.e., within the claimed ranges for the preheating temperature and amounts of O<sub>2</sub>, H<sub>2</sub> and steam), titanium dioxide powders with controlled specific surface area (i.e., 23.0-33.3 m<sup>2</sup>/g) and low rutile content (i.e., 2.2-8.0%) were obtained.

In contrast, Example 3 as well as Comparative Examples 1-3, which include preheating temperatures and amounts O<sub>2</sub>, H<sub>2</sub> and steam outside the claimed ranges, result in either no titanium dioxide powder at all (i.e., Comparative Example 3) or titanium dioxide powders with a high rutile content (i.e., Comparative Example 2 - 92.2%) or an uncontrolled specific surface area (i.e., Example 3 and Comparative Example 1 - 42.4 and 86.2 m<sup>2</sup>/g respectively).

Accordingly, Applicants submit that the above data provides an adequate showing of the criticality of the claimed ranges (i.e., preheating temperature and the amounts of hydrogen, oxygen and steam) pursuant to M.P.E.P. 2144.05 (III).

Thus, Applicants request withdrawal of this rejection.

**Conclusion**

For the reasons discussed above, Applicants submit that all now-pending claims are in condition for allowance. Applicants respectfully request the withdrawal of the rejections and passage of this case to issue.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,  
MAIER & NEUSTADT, P.C.

A handwritten signature in black ink, appearing to read 'Justine M. Wilbur', is written over a horizontal line.

Justine M. Wilbur  
Attorney of Record  
Registration No. 59,678

Customer Number

**22850**

Tel: (703) 413-3000  
Fax: (703) 413 -2220  
(OSMMN 08/07)